

What the microstructural properties of the Frontal Aslant of unimodal and bimodal bilinguals tell about language control

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The Frontal Aslant tract (FAT), a white matter tract connecting the Superior Motor Area complex with the Inferior Frontal gyrus, has been associated to the resolution of conflict among competitor motor programs (Dick et al., 2019). In the present study we investigated the role of this tract in bilingualism, comparing unimodal and bimodal bilinguals. Differently from unimodal bilinguals (UBs) who use two spoken languages, bimodal bilinguals (BBs) use a spoken and a signed language. The comparison between UBs and BBs allows addressing the issue of bilingual language control: While BBs can simultaneously utter a word and make a sign (Emmorey et al., 2008), UBs have always to select one word at a time for production. Using Diffusion Tensor Imaging we extracted the microstructural properties of the FAT from 24 UBs and 25 BBs and we correlated them with the performance in language production and comprehension tasks, performed in the first (L1) and in the second (L2) language. The correlational pattern reveals commonalities and differences between the two bilingual groups. The left FAT seems to be involved in the control of the L1 (spoken) during the production of the L2 (either spoken or signed). For BBs, the FAT is involved in the control of the signed L2 during the production of the spoken L1. Interestingly, the direction of the correlations suggests that the control exerted through the FAT diminishes as L2 proficiency increases, supporting the view that the locus of language control changes as a function of the degree of bilingualism.

References

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